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World Leader of In-Rack, Audio, Video, Data Monitoring, and Closed Captioning Solutions

AMP1A Series

- AMP1A-30
- AMP1A-Plus
- AMP1A-106
- AMP1A-LP10S

1 RU, Analog Audio Monitors with Level Meters

User Guide

Part Number 821020, Revision A

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AMP1A Series User Guide

Introduction

Overview

The AMP1A Series of audio monitors provides self-powered, full-fidelity stereo monitoring in the smallest rack space possible.

Topics

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Safety Instructions

1. Read, keep, and follow all of these instructions; heed all warnings.
2. Do not use this equipment near water.
3. Use only a dry cloth to clean the equipment.
4. Do not block any ventilation openings. Install only in accordance with the instructions in the section entitled, "Installation Recommendations" on page 3.
5. Do not install near any heat source such as a radiator, heat register, amplifier, or stove.
6. Do not expose the equipment to rain or moisture.
7. Do not attempt to plug the unit into a two-blade outlet (with only two prongs of equal width).

IMPORTANT: By design, these monitors will only plug into a three-prong outlet for your safety. If the plug does not fit into your outlet, contact an electrician to replace the obsolete outlet.

8. Protect the power cord from being walked on or pinched, particularly at plug's source on the equipment and at the socket.
9. Use only the attachments/accessories specified by the manufacturer.
10. Unplug the equipment during lightning storms or when unused for long periods of time.
11. Refer all servicing to qualified service personnel. Servicing will be required under all of the following conditions:
    - The equipment has been damaged in any way, such as when the power-supply cord or plug is damaged.
    - Liquid had been spilled or objects have fallen onto the equipment.
    - The equipment has been exposed to rain or moisture.
    - The equipment does not operate normally.
    - The equipment has been dropped.

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Installation Recommendations

Unpacking

Unpack the AMP1A Series monitor from the shipping container and inspect all components for shipping damage. If you find any damage, notify the shipping carrier for claims adjustments.

Compare the shipping box contents to the packing slip. Contact Wohler's customer support personnel about any discrepancies. (Wohler's contact information in on the copyright page ii, of this manual).

Heat Dissipation

The ambient temperature inside the mounting enclosure should not exceed 40° Celsius (104° Fahrenheit). Adjacent devices can be rack mounted (or stacked) in proximity to the unit if the above temperature is not exceeded. Allow a 1RU (1.75"/44.45mm) space above and below the unit for air circulation.

Important: The heat generated by the power amplifiers, power supplies, and other components is vented by slots in the side of the unit. Therefore, as a safety precaution, we advise you to be sure to allow proper ventilation on both sides of the unit.

Rack Mounting

You should install the monitor into a standard 19" rack and requires a maximum of 3RU of rack space (the 2RU unit, plus 1RU above and below). Also, install it as close to the operator's direct viewing angle as possible as LCD screens can appear to display anomalies outside this viewing angle.

Cable Connections

Wohler recommends Beldon 8281 or Belden 1694A cables for analog video signals and Beldon 9451 cables for analog audio signals.

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Power

Each unit comes with a standard 24VDC/3.0A internal power supply and connects an A/C mains power source (65W, 100 to 240 VAC, 50/60Hz) to the IEC connector provided on the rear panel of the unit.

Electrostatic Discharge (ESD)

As with most electronic equipment, static discharges can damage components within the unit. Take precautions to ensure your installation environment is not subject to ESD.

Description

All models in the AMP1A series contain four high performance transducers driven by three power amplifiers: two amplifier/driver combinations handle midrange and high frequency information in stereo, while the third center channel reproduces information below the 500 Hz crossover point through dual woofers.

All AMP-1A analog audio models come equipped with stereo volume and balance potentiometers, a power indication LED, and a headphone output. Output limiter circuits are incorporated to protect the speakers, and extensive magnetic shielding allows placement immediately adjacent to video monitors with no color impurities.

Application

The AMP1A Series is ideally suited for use in VTR bays, mobile production vehicles, teleconferencing installations, multimedia systems, satellite links and cable TV facilities, and on-air radio studios. Designed and manufactured in the U.S., the AMP1A is backed by a strong warranty and a satisfaction guaranteed return policy.

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Features

- 98 dB SPL at two feet
- Only one rack space high
- Excellent high frequency response for positive detection of background whine and noise
- Audible indication of phase/polarity problems
- Thorough magnetic shielding for placement next to video monitors
- Numerous control and input options
- Quick and easy installation: simply slide in the rack and connect audio and AC power

Specifications

The AMP1A Series monitors meet the following specifications.

Table 1–1 AMP1A Series Monitors Specifications

Specification	AMP1A-30	AMP1A-106	AMP1A-LP10S	AMP1A Plus
Inputs	2 Balanced Analog Audio on XLR (Left & Right)		2 Banks of 10 Phoenix (Left & Right)	4 Balanced Analog Audio on XLR (Left & Right) 2 Unbalanced RCA
Outputs	2 Analog Audio on XLR (Left & Right)			
Input Impedance	> 40k Ω balanced			
Input Level for Maximum Output (Volume Full On)	0 dB balanced			
Input Overload	+26 dBv balanced			
Peak Acoustic Output (at 2 ft.)	98 dB SPL			
Response, 6th Octave	80 Hz to 16 kHz ± 7 dB (-10 dB @ 50 Hz to 22 kHz)			
Power Output RMS Each Side RMS Base	10 W transient / 5 W continuous 20 W transient / 10 W continuous			

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Table 1–1 AMP1A Series Monitors Specifications

Specification	AMP1A-30	AMP1A-106	AMP1A-LP10S	AMP1A Plus
Distortion, Electrical	< 0.15% at any level below limit threshold			
Distortion, Acoustic	8% or less at worst case frequencies above 180 kHz including cabinet resonance; typically <2%			
Hum and Noise	Better than -68 dB below full output			
Magnetic Shielding	<1 Gauss any adjacent surface			
Power Consumption (Average Maximum)	35 W			
AC Mains Input	100 to 240 V AC, 50 to 60 Hz			
Dimensions	1.75 " H x 19" W x 12" D (44.5 mm H x 483 mm W x 298 mm D)			
Weight	14 lbs. (6.4 kg)			

Table 1–2 below lists the specifications for the level meters for all of the monitors in the AMP1A Series except for the AMP1A Plus which does not include level meters.

Table 1–2 Level Meters Specifications

Specification	AMP1A-30	AMP1A-106	AMP1A-LP10S
Level Calibration	-6, 0, +4, +8 dBv		
Frequency Response	20 Hz to 18 kHz (± 0.5 dB)		
Level Meter Type	30-Segment,	106-Segment	10-Segment
	Two Tri-Color LED Bar Graph		
LED Color	Tri-Color: Red, Green, and Amber		
Metering Range	65 dB (+16 dB to -49 dB)	72 dB (+16 to -56 dB)	23 dB (+3 to -20 dB)
Display Modes	VU or PPM, Selectable		
VU Characteristics Rise Time Fall Time	300 ms to 99% of full indication 300 ms		
PPM Characteristics Attack Time Decay Time	10 ms 2 seconds, 0 to -20 dB		

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Audio Amplifier and Speaker Configuration

Audio Amplifiers

All AMP1 Series models contain high performance speakers driven by three power amplifiers; two amplifier/driver combinations handle midrange and high frequency information in the left and right (stereo) speaker channels, while the third amplifier channel sums the left and right channel information below the 500 Hz crossover point in the woofer (bass) speaker(s). Note that the woofer channel is not a dedicated LFE or center channel.

Speaker Configuration

The 1U rack size AMP1 Series products are configured with two speakers (left and right) to reproduce mid- and high-range audio frequencies (in stereo), but feature two woofer speakers to reproduce the summed (combined) low-range audio frequencies from the left and right speaker input channels. It should be noted that both woofer speakers, which are wired in series, are driven from one woofer speaker channel, and are not stereo. See the simplified diagram below for a block diagram of the AMP1 Series audio amplifier/speaker configuration.

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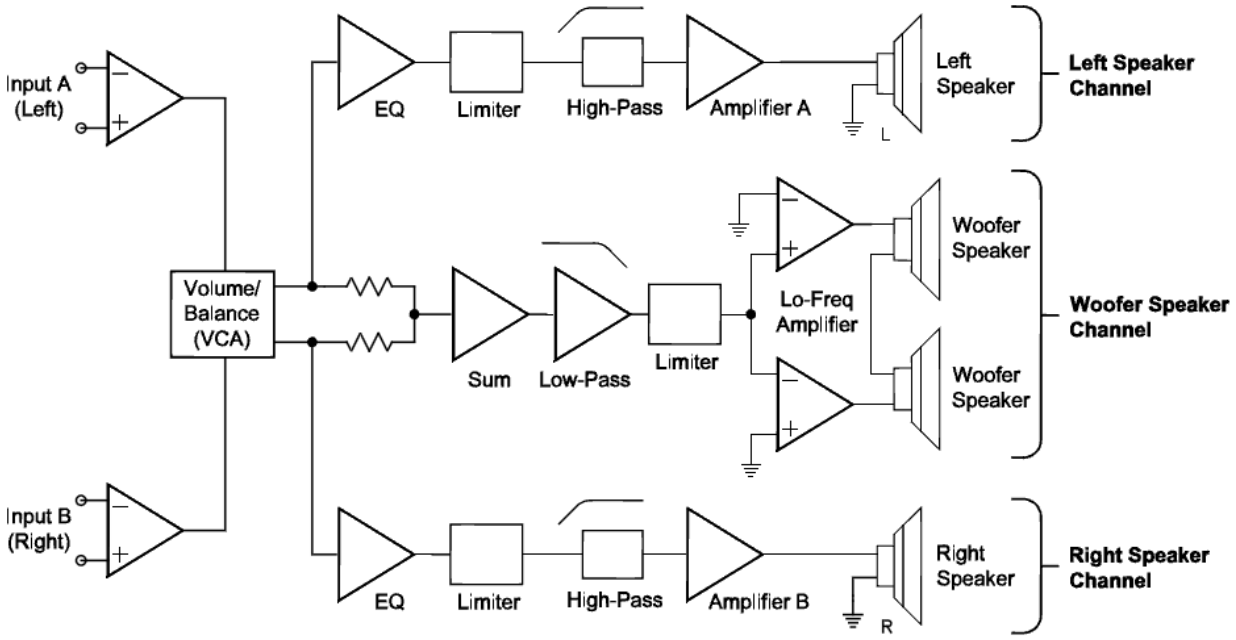
Figure 1–1 Audio Amplifier and Speaker Configuration



Optional Features

Wohler Technologies, Inc. offers by far the broadest range of standard production audio monitors. Standard-production AMP1A Series monitors or special orders can include the following functions (and combinations thereof):

- Separate channel volume controls (SVC Option)
- Alternate level meter scales and color maps
- Bar graph display phase correlation (F Option)
- Multiple input and output connector type choices

For other custom orders, contact your Wohler Sales representative. (Wohler's contact information is on the copyright page of this document.)

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Front Panel Controls

Common Controls

- **Speakers**: The AMP1A internal speaker system is comprised of two mid-range tweeter speakers (left and right) and two woofer speakers (left and right). The two mid-range speakers reproduce, in stereo, only the mid and high frequencies, while the two woofer speakers monaurally reproduce the low frequencies.

- **Volume Control**: This controls the loudness of the audio reproduced by the internal speakers or connected headphone. Clock-wise rotation of this control increases the loudness of the monitored audio.

- **Headphones**: The headphone output monitors the same audio signals as monitored through the internal speakers. However, when you plug in headphones, the internal speakers will mute. This jack accepts a standard 1/4" phone type stereo plug.

- **Power LED**: This LED glows green to indicate the monitor is connected to operational mains power.

- **Audio Level Meters**: Audio levels are visually displayed via thigh-resolution tri-color (red, amber, green) LED bar graph display level meters. The upper level meter monitors Channel A (left) while the lower level meter monitors Channel B (right). These bar graph displays feature an auto-calibration feature and are user adjustable for display mode and reference level via a rear panel DIP module. Peak hold, PPM ballistics, and alternative scales can be set through an internal DIP switch.

- **Balance Control**: This pans the volume balance between the left and right speakers. The balance control attenuates the signal from the source, so that the left and right bass frequencies (summed together and reproduced in the woofer channel) will also respond to the balance control.

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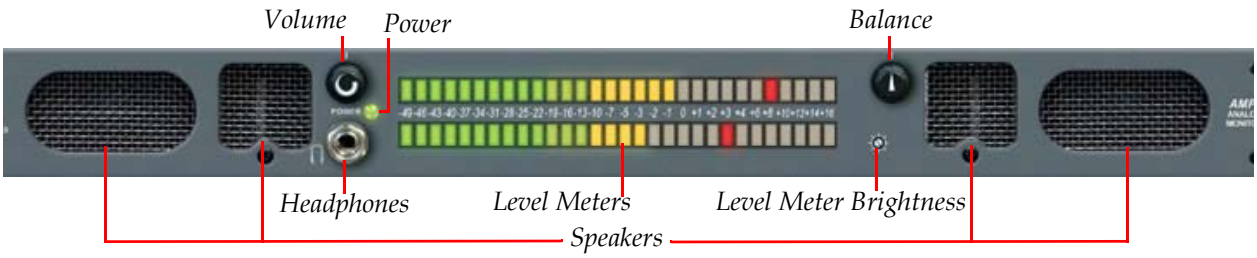
Example If an audio signal of a voice speaking English is fed to the "A" (left) input and a voice speaking Spanish is fed to the "B" (right) input, then the left speaker channel will reproduce the mid-range and high-range frequencies of the English speaking voice, the right speaker channel will reproduce the mid-range and high-range frequencies of the Spanish speaking voice, and the woofer speaker channel will reproduce the summed (combined) low-range frequencies of *both* voices.

If the balance control is *panned to the left*, then the Spanish speaking voice in the right speaker channel will diminish in volume, the Spanish speaking voice in the woofer speaker channel will also diminish, and the English speaking voice in both the right speaker channel and woofer speaker channel will increase slightly (to maintain overall output level). The converse is true if the balance control is panned to the right.

AMP1A-30-Specific Front Panel Controls

Figure 1–2 AMP1A-30 Front Panel



- **Level Meters**: The AMP1A-30 features two, 30-segment, bar graph audio meters.
- **Level Meter Brightness** (Recessed Rotary Switch): This control is recessed into the front panel and can be accessed using a small flathead screwdriver. Turning it clockwise will increase the relative brightness of the bar graph LED segments. Adjusting this one control will simultaneously affect the brightness of both bar graph displays.

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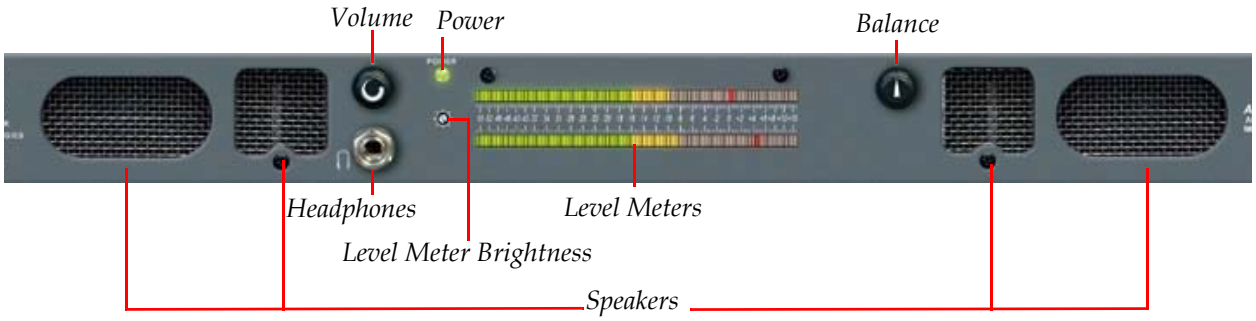
AMP1A-106-Specific Front Panel Controls

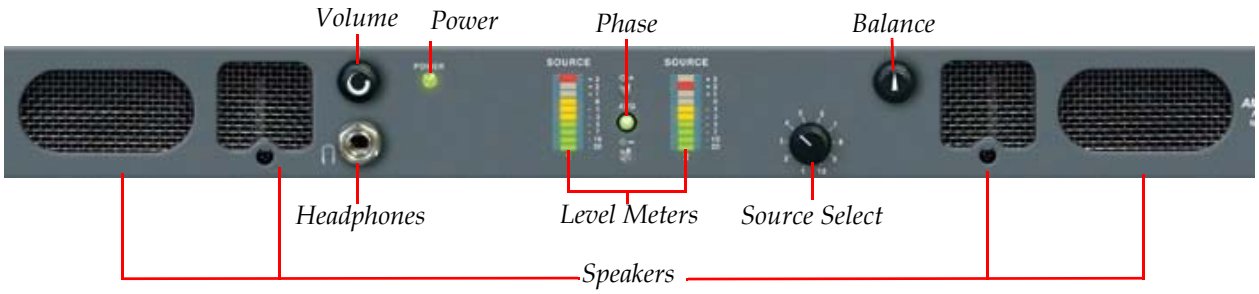
Figure 1–3 AMP1A-106 Front Panel



- **Level Meters**: The AMP1A-106 features two, 30-segment, bar graph audio meters.
- **Level Meter Brightness**: This control is recessed into the front panel and can be accessed using a small flathead screwdriver. Turning it clockwise will increase the relative brightness of the bar graph LED segments. Adjusting this one control will simultaneously affect the brightness of both bar graph displays.

AMP1A-LP10S-Specific Front Panel Controls

Figure 1–4 AMP1A-LP10S Front Panel



- **Level Meters**: The AMP1A-LP10S features two, 10-segment, bar graph audio meters.
- **Source Select** (10-Position Rotary Switch): This switch selects, from the multi-channel inputs, a single stereo audio source (2 channels) for monitoring through the unit.

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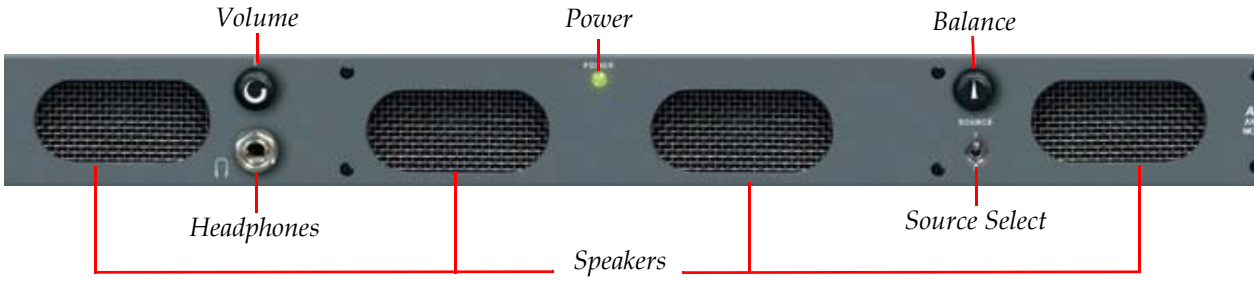
- **Phase** (LEDs): These three LEDs indicate the instantaneous and average phase (polarity) conditions between the sources) assigned to the left speaker channel and the source(s) assigned to the right speaker channel. The larger LED labeled **AVG** indicates the average phase condition between the left and right speaker channels. The two smaller LEDs labeled Φ+ and Φ- indicate the instantaneous phase relationships. Indication is as follows:
  - The upper Φ+ LED glows (or blinks) green for in-phase signals.
  - The lower Φ- LED glows (or blinks) amber for out-of-phase signals.
  - The large center **AVG** LED indicates the average phase condition by glowing green for in-phase signals, or red for out-of-phase signals.

  In general, observing the average LED alone is sufficient for proper phase monitoring. While it is normal for stereo signals to contain some intermittent instantaneous out-of-phase and in-phase conditions (Φ+ and Φ- LEDs), a steady red glow of the average LED indicates an out-of-phase alarm condition.

AMP1A Plus-Specific Front Panel Controls

Figure 1–5 AMP1A Plus Front Panel



Source Select (Toggle Switch): This switch selects either the **Source 1** or **Source 2** inputs for monitoring.

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Rear Panel Connectors

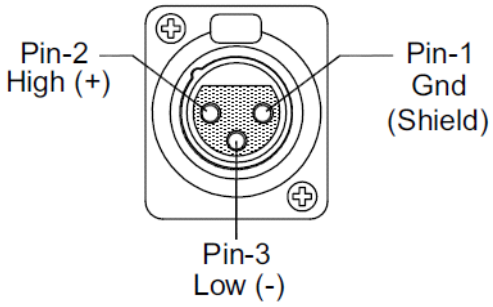
Common Connectors

- **Power** (IEC-320): Attach the included power cord between this connector and mains power (100 to 250VAC, 50 to 60 Hz). The front panel **Power** LED will glow green to indicate operating voltages are present.

- **Balanced Analog Audio Input** (on XLR-F): These two 3-pin female XLR connectors (left and right) accept standard analog audio signals and are configured for 50K Ω balanced connections. Pinout information for the XLR connectors is shown at bottom of this page.

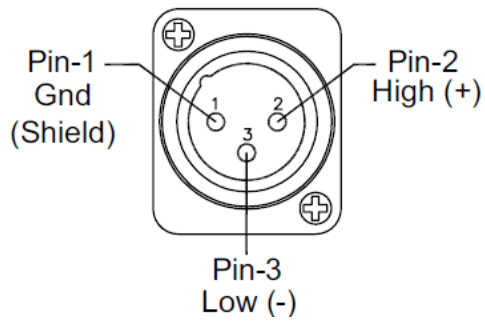
  Note: The AMP1A-LP10S does not include this feature and the AMP1A Plus has two pair of these connectors.

Figure 1–6 XLR-F Pin-Out



- **Selected or Loop-Through Analog Audio Output** (XLR-M): These two 3-pin male XLR connectors output balanced low impedance analog signals. Pinout information for connectors is shown Figure 1–7 below.

Figure 1–7 XLR-M Pin-Out



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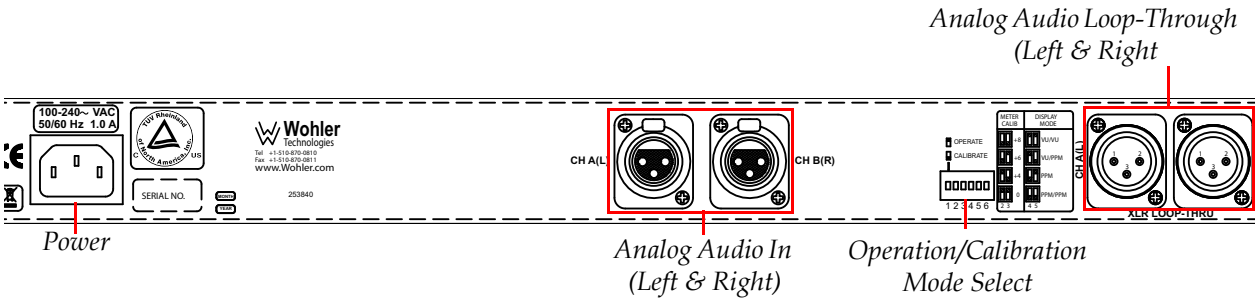
AMP1A-30 and AMP1-106 Rear Panel Connectors

Figure 1–8 AMP1A-30 and AMP1-106 Rear Panel



Connector Descriptions

Operation/Calibration Mode Select (Six-Position DIP Switch): This switch sets the Line Level Calibration, Reference Level, and PPM/VU Display Mode. See Table 1–3 below and Figure 1–9 on page 15 for details.

Table 1–3 Operation/Calibration Mode Select Switch Settings

Switch Numbers[a]	Function	Description
1	Operation/ Calibration	Determines whether the monitor is in a normal operational mode or a calibration cycle.
2 and 3	Reference Level	Adjusts the level of the input signal and the resultant level displayed on the LED bar graphs. Factory setting is +4 dB.
4 and 5	Display Mode	Determines how peak levels are displayed for the associated meters on the front panel. The four settings include: • VU Only, • VU-PPM Floating Segment, • PPM Only, and • PPM-PPM Floating Segment. The VU Only selection has a VU floating segment when a peak hold value is selected using the internal 10-position DIP switch module. The factory default setting is VU-PPM floating segment.
6	Not Used	

a The switch numbers in the DIP switch module are numbered from left to right.

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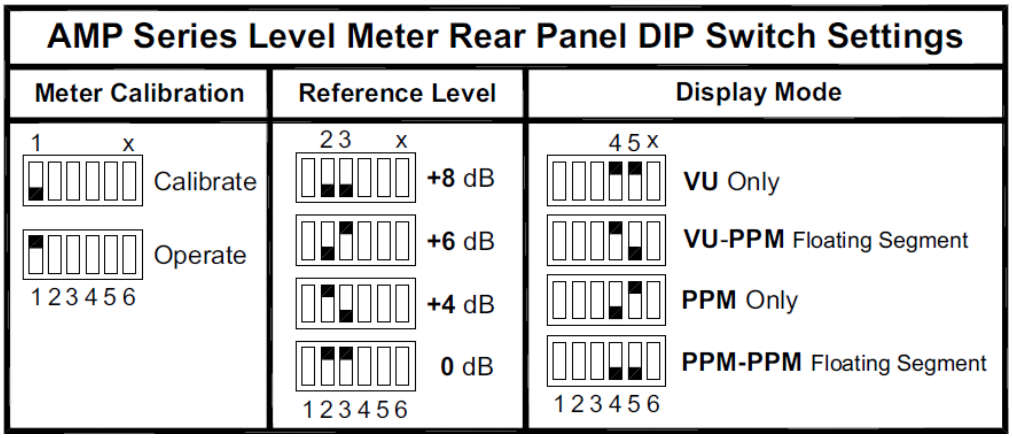
Figure 1–9 DIP Switch Settings



Note: Switch position 6 is not used.

Calibration Instructions

1. Turn on the power.
2. Apply the desired reference level (nominal 0) signal to all channels.
3. Make sure the reference level DIP sections (2 and 3) are set to the nearest level of the input signal being applied for calibration (i.e., 0, +4, +6 or +8). Verify that the signal applied to all four channels is within ± 4 dB of the reference level set in DIP switches 2 and 3.
4. Place DIP Switch 1 in the down position (calibration).
5. Wait 10 seconds for the unit to update its calibration to your settings.
6. Place DIP Switch 1 in the up position (operation) and return unit to service.

   Note: You can only auto-calibrate the monitor once for each power cycle. Once you have put DIP Switch 1 in the calibration position, you must cycle the power before that DIP switch will be functional again, even if a calibration attempt was unsuccessful.

   If you want to re-calibrate, turn off the power to the unit and repeat steps 1 through 6.

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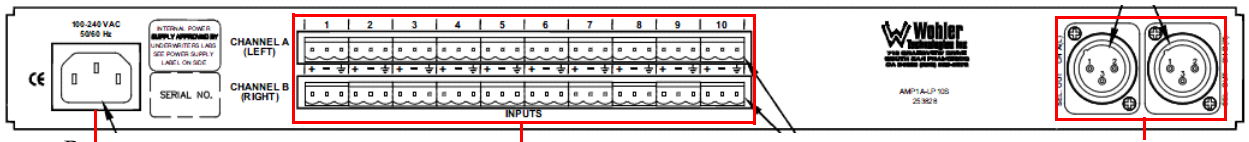
AMP1A-LP10S-Specific Rear Panel Connectors

Balanced Inputs (Channels 1-10, Left and Right, 3-Pin Male Phoenix): These balanced (90K Ω) 3-pin Phoenix connectors accept standard analog audio signals. The two banks of inputs, Channel A (Left) and Channel B (Right), are comprised of ten connectors each for a total of twenty inputs (ten stereo pairs). Connector pinout information is silk-screened on the rear panel between the two rows of connectors.

Figure 1–10 AMP1A-LP10S Rear Panel



Power

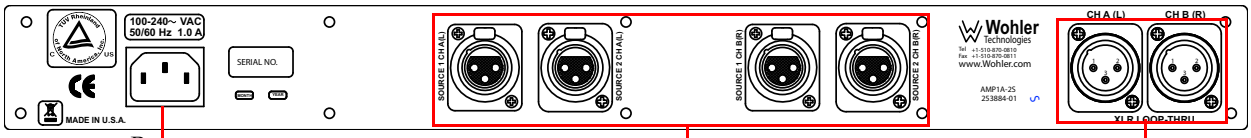
Analog Audio Inputs (Left & Right)

Selected Analog Out (Left & Right

AMP1A Plus-Specific Rear Panel Connectors

The AMP1A Plus provides two analog audio inputs, Channel A (left) and Channel B (right).

Figure 1–11 AMP1A Plus Rear Panel



Power

Analog Audio In with Loop-Through (Left & Right)

Selected Analog (Left & Right

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Internal Switch Settings

After removing the top cover, you can access DIP switches that control level meter settings and/or calibration settings.

AMP1A-30 and AMP1-106 Internal Switch Settings

This 10-position DIP module is located on the 919174 PCB. Refer to Figure 1–12 below for a complete list of settings and functions. (Switch positions 1 and 10 are not used and should be left at the factory set position.)

Figure 1–12 0-Position DIP Switch Settings

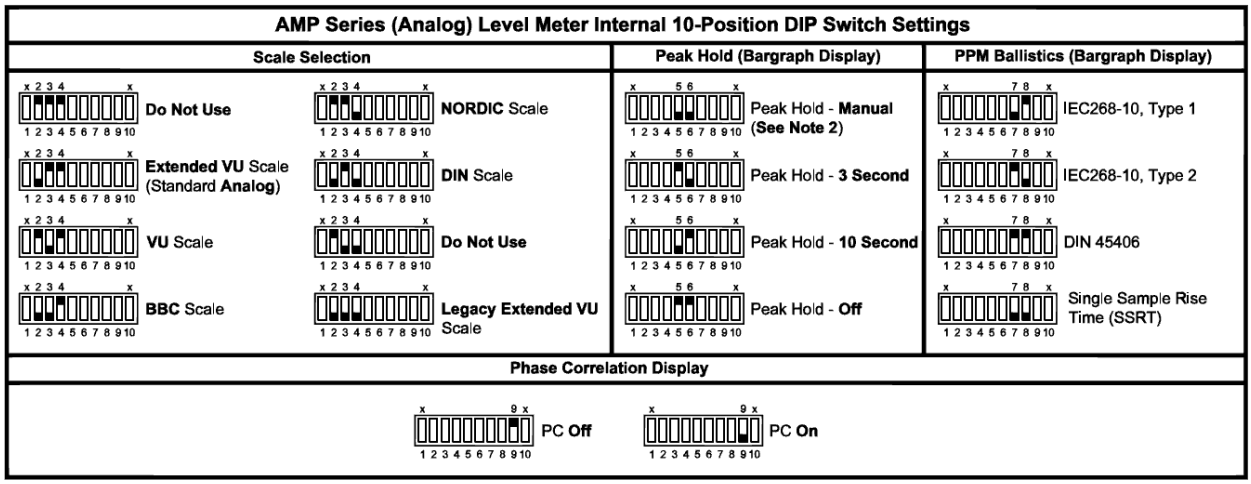

Figure 1–13 on page 18 illustrates the DIP switch location on the PCB.

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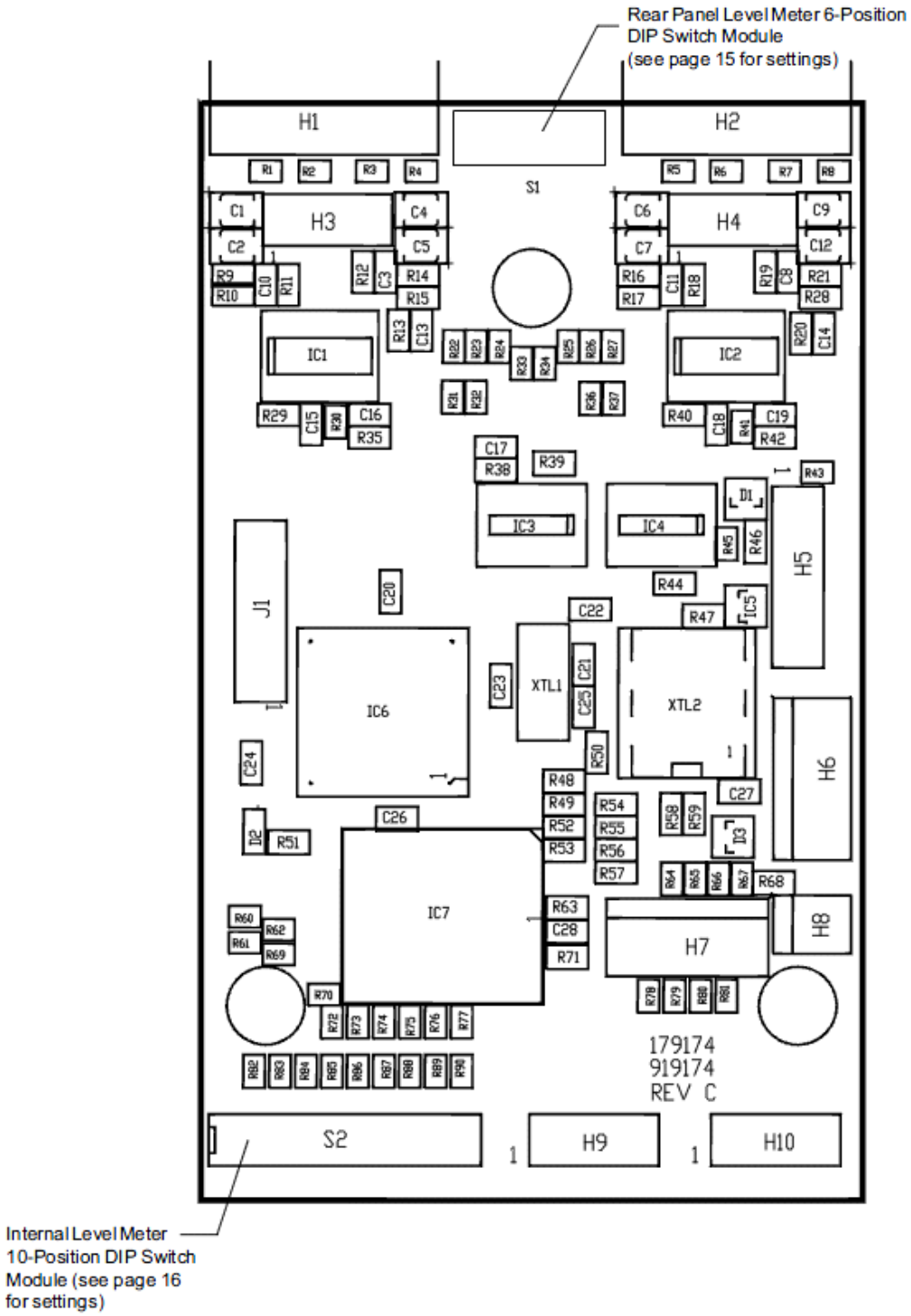
Figure 1–13 Internal DIP Switch Location



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Scale Selection

The standard scale used on the 30-segment bar graph display for the AMP1A-30 is the Extended VU scale. However, if alternative scale characteristics are selected for the level meters by setting the Alternate Scale DIP switches (Figure 1–12 on page 17), it is recommended that a label with the appropriate scale be applied to the front panel LED bar graph level meters. Alternate scales include the VU, BBC, Nordic, and DIN scales. The Extended VU scale is the standard scale for all AMP1A Series models. See Figure 1–14 below for 30-segment alternate scales. Contact Wohler Technologies for more information about Alternate Scale labels.

Figure 1–14 30-Segment Scale Selection Options

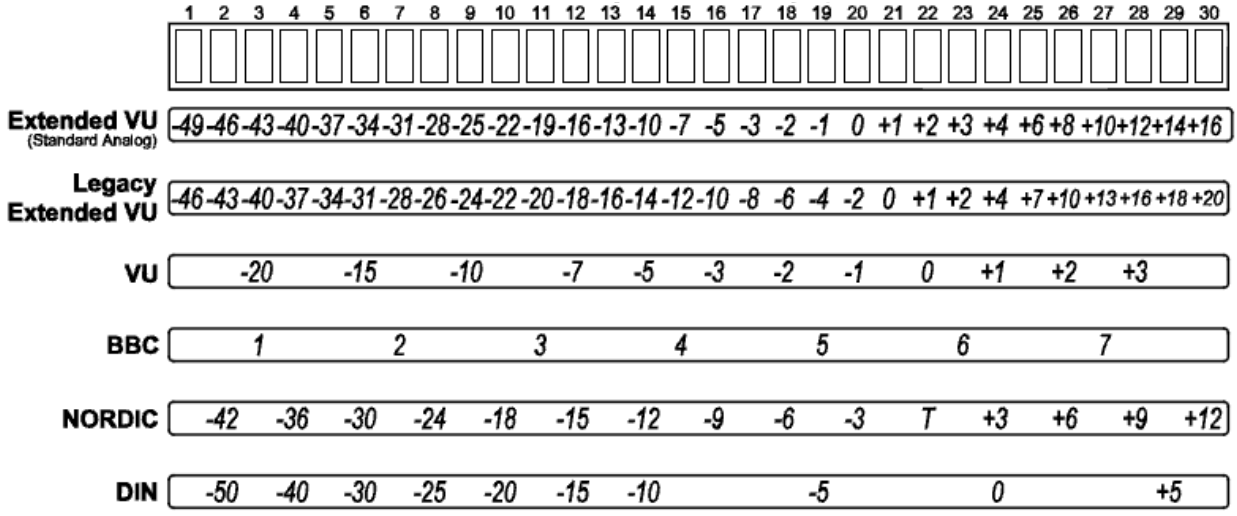
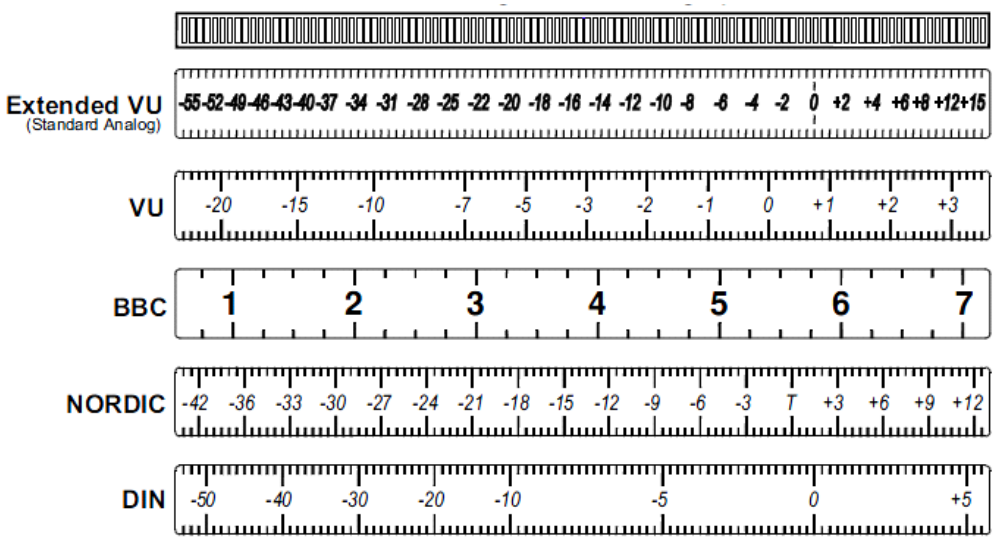


Figure 1–15 106-Segment Scale Selection Options



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Peak Hold

The Peak Hold - Manual setting allows the bar graph display meters to indefinitely maintain the peak hold value until you reset it, either by pressing a reset button (a special option specified at time of order) or by removing power and then reapplying power to the unit (unplug/replug power cord). Contact Wohler Technologies for more information about this feature.

PPM Characteristics

The PPM characteristics determine the integration time (rise time) and return time (fall time) of the level meter. The integration time is the time it takes for the lighted segments of the level meter, after application of a 5 kHz tone at a certain reference level, to rise within a specified number of dB of that level. Return time is the time it takes for the lighted segments of the level meter to fall a certain number of dB after removal of a 5 kHZ tone of a certain reference level. The PPM characteristics available for selection using DIP switch sections 7 and 8 of the 10-position Internal DIP Switch (Figure 1–12 on page 17) are listed in Table 1–4 below.

Table 1–4 PPM Ballistics and Integration/Return Time Relationships

PPM Ballistics	Integration/Return Times
IEC268-10, Type 1	Integration (Rise) Time is 5 ms (-2 dB); Return (Fall) Time is 1.7 seconds (20 dB)
IEC268-10, Type 2	Integration (Rise) Time is 10 ms (-2 dB); Return (Fall) Time is 2.8 seconds (24 dB)
DIN 4506	Integration (Rise) Time is 5 ms (-2 dB); Return (Fall) Time is 1.5 seconds (20 dB)
Single Sample	Integration (Rise) Time is a single sample; Return (Fall) Time is 1.5 seconds (20 dB)

Phase Correlation Display

Since it is sometimes helpful to observe phase relationships between two signals being monitored, you can enable the phase correlation feature within the lower section of the existing bar graph pair in the AMP1A-30. This feature is enabled by setting a switch on the internal 10-position DIP switch module located internally on the PCB. See Figure 1–13 on page 18 for DIP module location, and Figure 1–12 on page 17 for settings. The labels for this feature (see diagram below) can be specified at the time of order or requested from Wohler for application to existing units.

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Figure 1–16 AMP1-30 Phase Correlation Labels

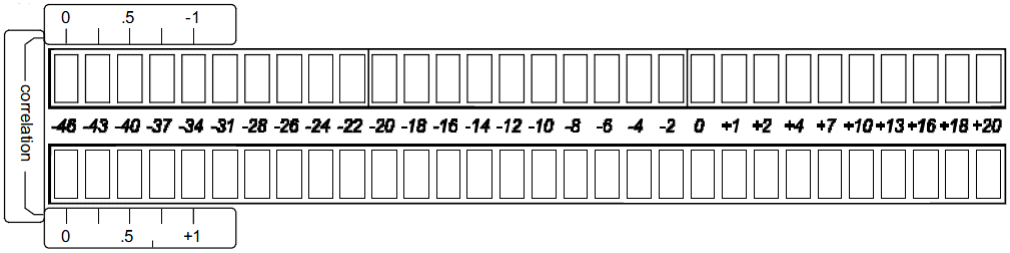
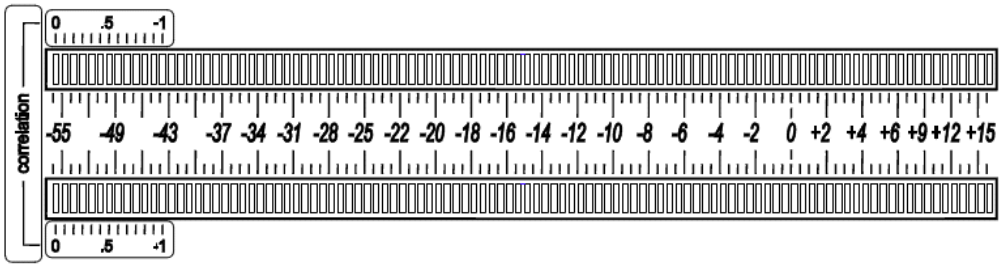


Figure 1–17 AMP1A-106 Phase Correlation Labels



Positive amounts of correlation are indicated by an ascending amber bar in the lower (right channel) bar graph; negative correlation is shown when a red bar ascends in the top (left channel) bar graph. While the audio level in both channels is high enough, the phase correlation indication occupies the bottom 13 segments of both bar graphs of a 30-segment stereo pair. One additional segment above the active correlation region is always off, to serve as a marker. The correlation display is visible only so long as the VU audio level is above this blank segment (fourteenth segment up on the 30-segment bar graph).

AMP1A Plus and AMP1A-LP10S Internal Switch Settings

Level Meter DIP Switch Settings

Two DIP switch modules, accessed through an opening in the top cover, allow the user to set the bar graph display mode and meter input gain calibration independently for each of the two bar graph displays. There are four sections (S1, S2, S3, S4) on each DIP switch module. The first two sections (S1, S2) are for setting the meter input gain calibration and the second two sections (S3, S4) are for setting the bar graph display mode. See Figure 1–18 on page 22.

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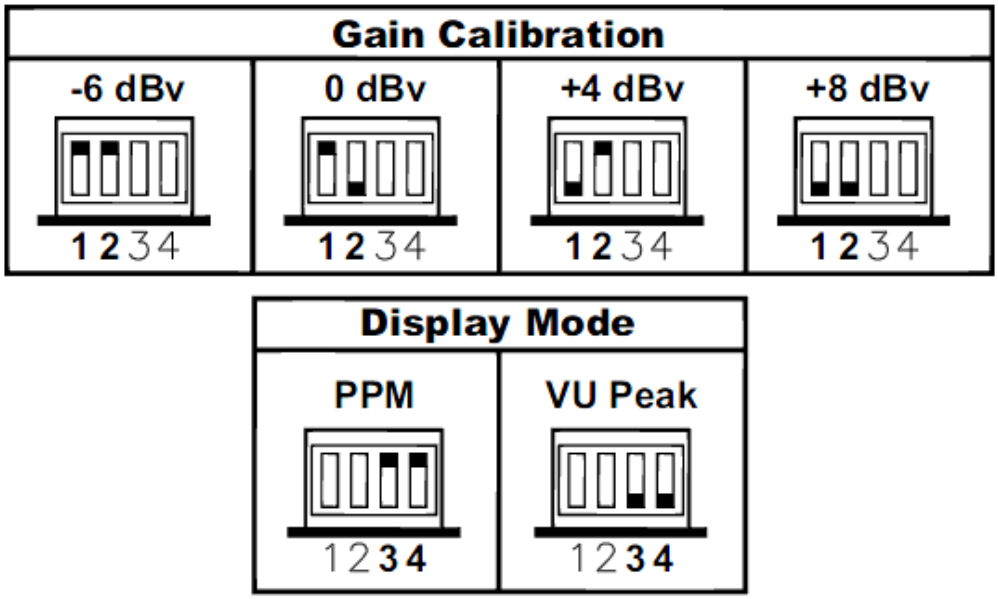
Figure 1–18 Meter Input Gain Calibration and Display Mode DIP Switch Settings



Meter Input Gain Calibration Settings

DIP switch sections S1 and S2 set the meter input gain calibration, which determines the level of the input signal that will result in a "0" reading on the meter bar graphs. The factory setting is +4 dBv, but can instead be set for -6 dBv, 0 dBv, or +8 dBv by the user.

Bar Graph Display Modes

DIP switch sections S3 and S4 determine how peak levels are displayed (display mode) and select either the "PPM" mode or an auto-reset "VU Peak" mode (not the PPM value!). The PPM mode exhibits an attack time of 10 milliseconds and a decay time of 2 seconds from 0 to -20 dB. The VU mode exhibits a 300 millisecond rise to 99% of full indication and a decay of 300 milliseconds. The factory setting is VU mode.

Technical Functional Overview

Figure 1–19 on page 23 through Figure 1–22 on page 26 illustrate the overall functionality of the AMP1A Series monitors.

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Figure 1–19 AM1A-30 Block Diagram

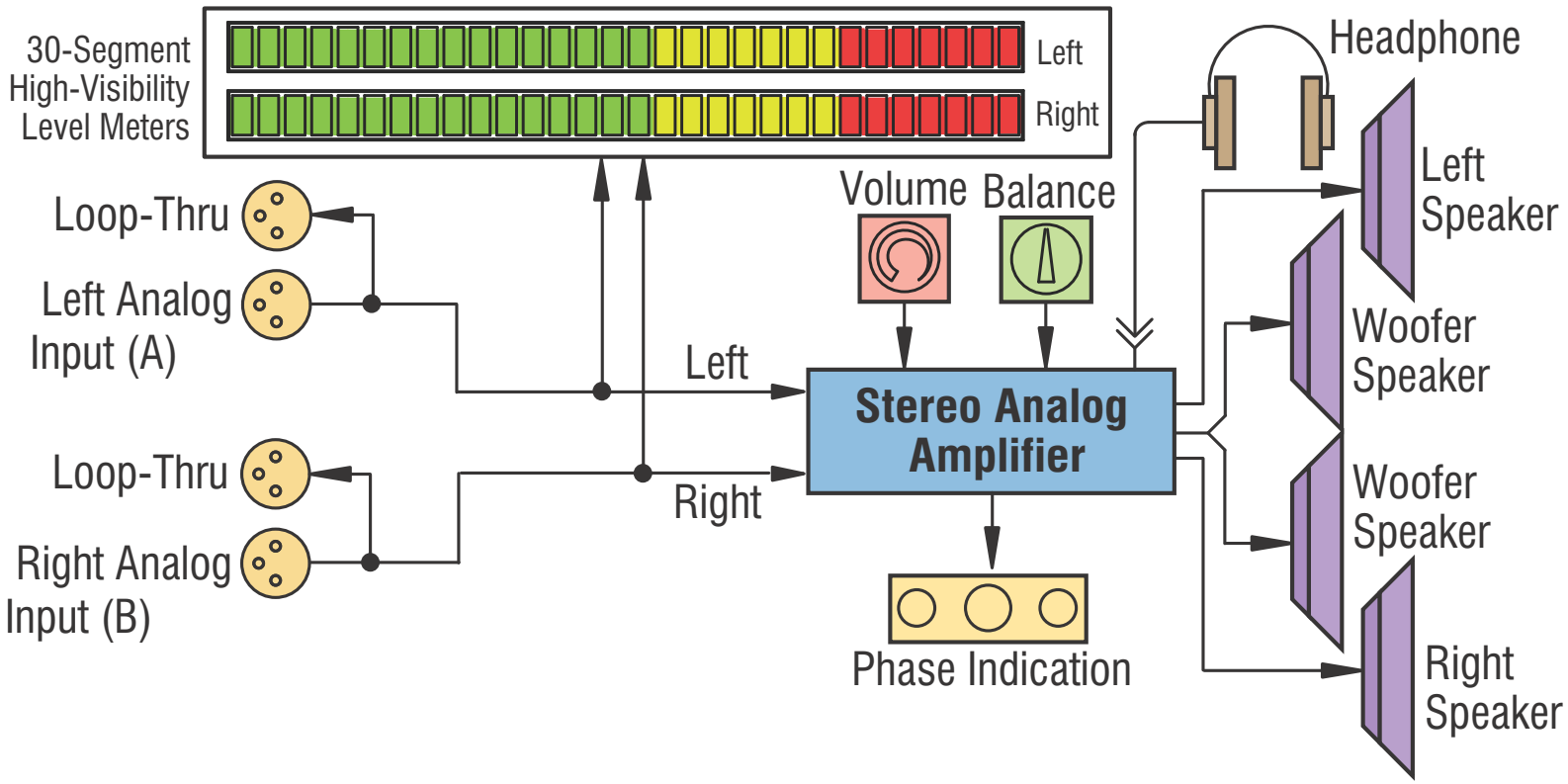

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Figure 1–20 AMP1A-106 Block Diagram

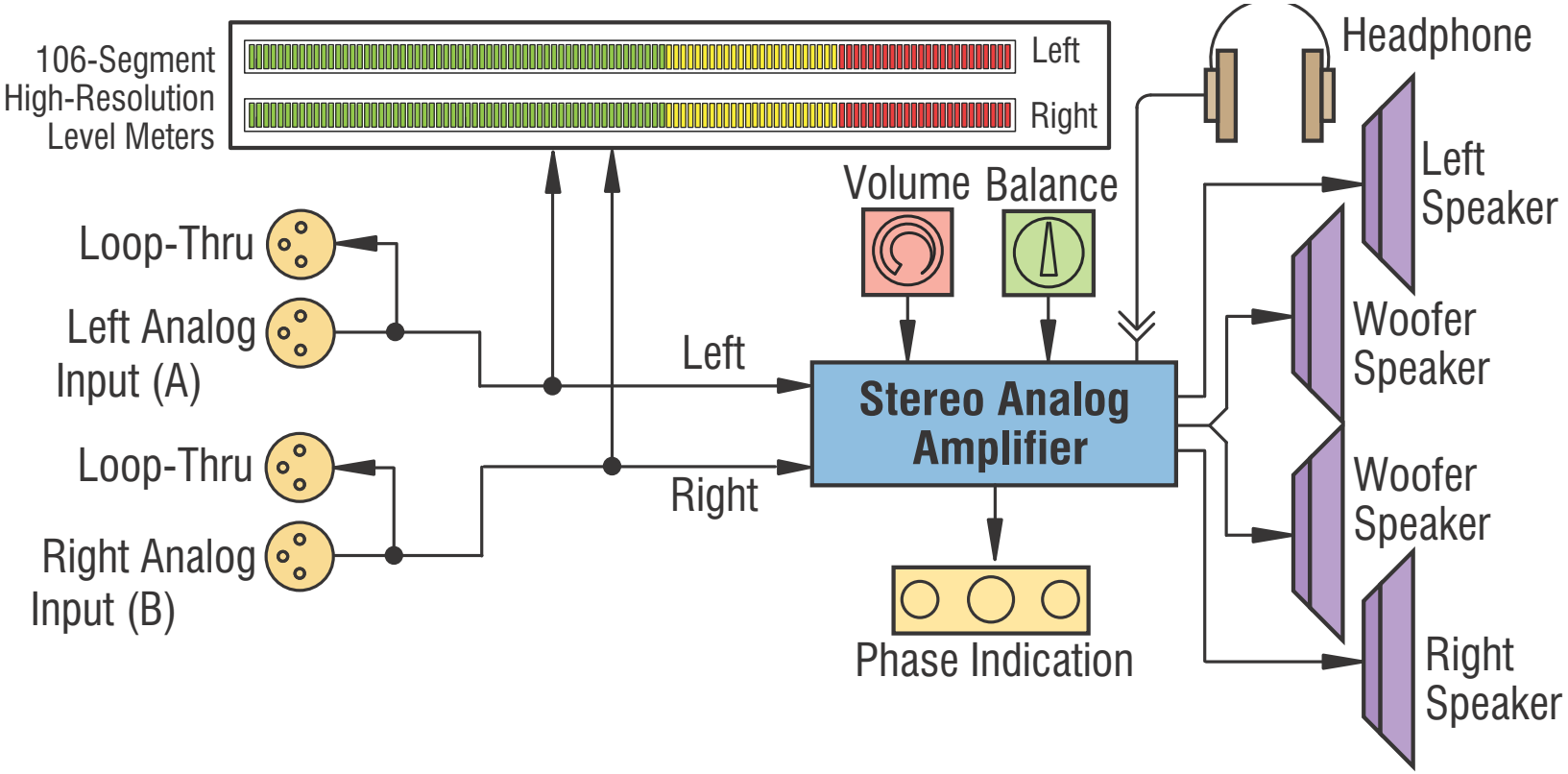

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Figure 1–21 AMP1A-LP10S Block Diagram

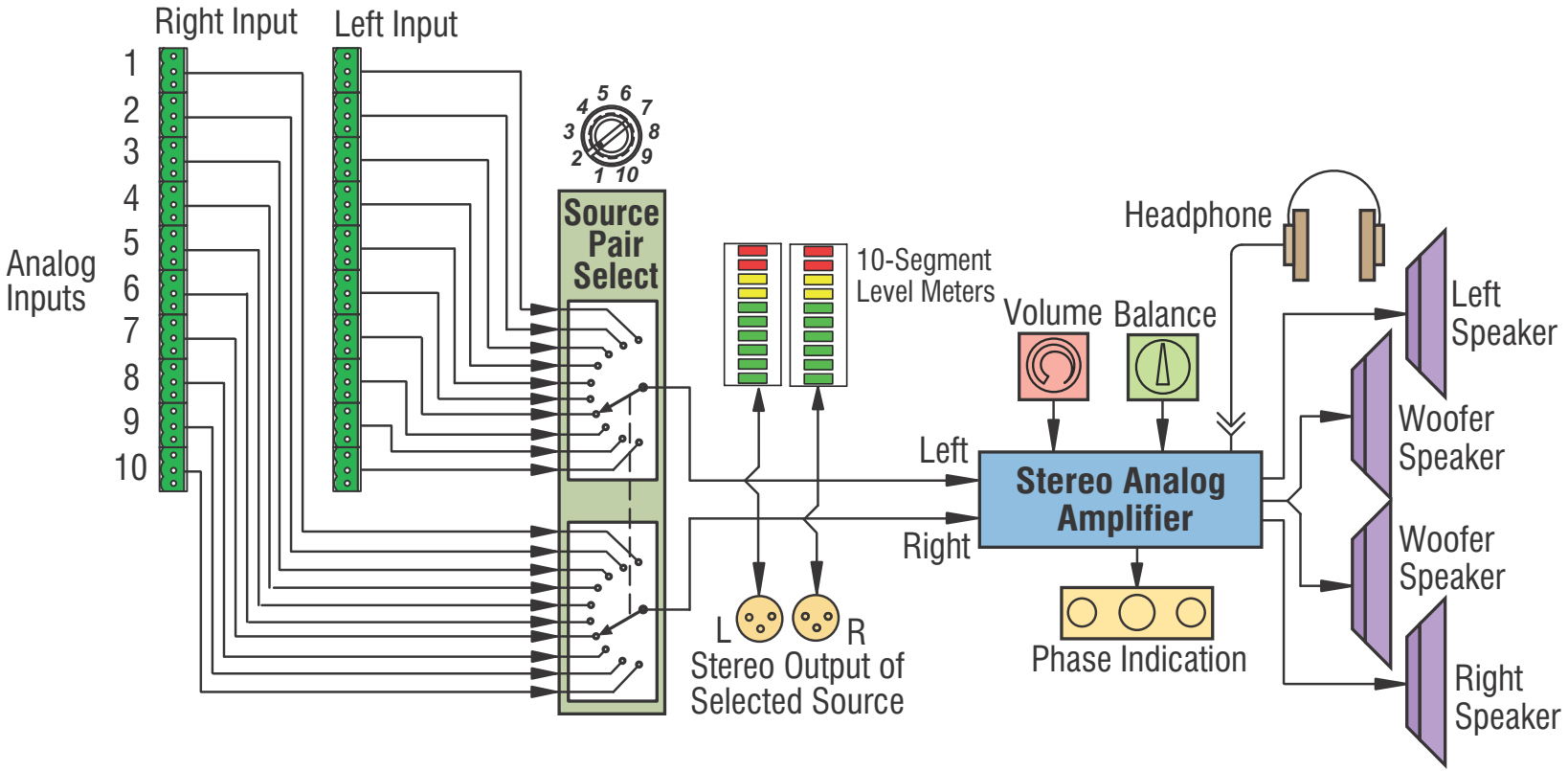

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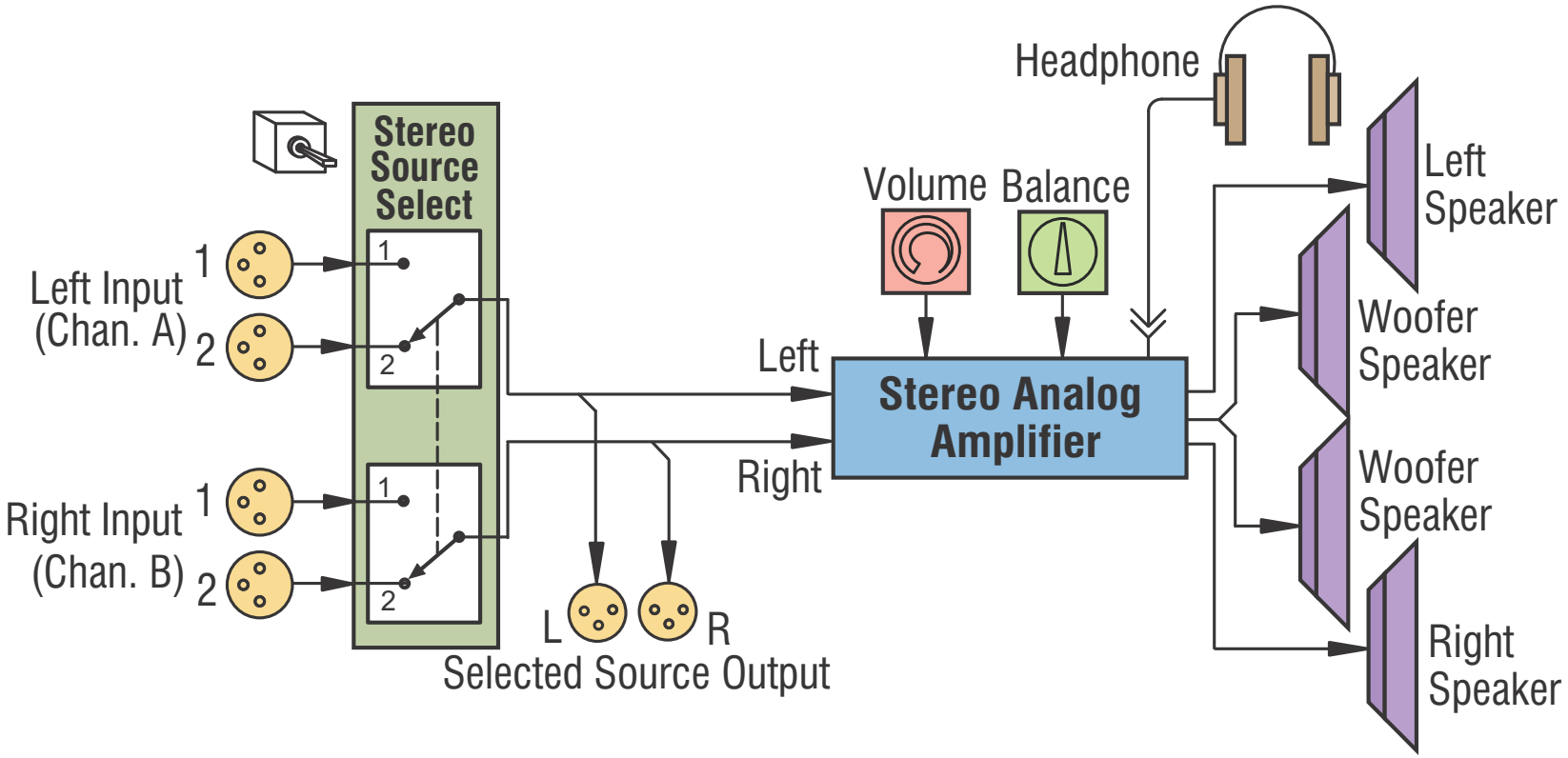
Figure 1–22 AMP1A Plus Block Diagram



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